

What is claimed is:

1           1.     An at least partially purified DNA molecule comprising a sequence of  
2 nucleotides that encodes an  $\alpha_1$  subunit of a mammalian T-type calcium channel.

1           2.     The DNA molecule of claim 1, wherein the sequence of nucleotides is selected  
2 from sequences of nucleotides encoding a protein including the sequence of amino acids set  
3 forth in SEQ ID. No. 18, 20, 24, 26, 28, 31, 33, or 35 and sequences of nucleotides that  
4 hybridize under conditions of medium hybridization stringency to DNA encoding a protein  
5 including the sequence set forth in SEQ ID No. 18, 20, 24, 26, 28, 31, 33, 35.

1           3.     The DNA molecule of Claim 1, wherein the calcium channel is a human  
2 calcium channel.

1           4.     The DNA molecule of claim 1, further comprising a promoter region effective  
2 to promote expression of the  $\alpha_1$  subunit of a mammalian T-type calcium channel when the  
3 DNA molecule is transfected into a vertebrate cell.

1           5.     The DNA molecule of claim 1, having the sequence as set forth in Seq. ID. No.  
2 23, 25 or 27.

1           6.     The DNA molecule of claim 1, wherein the molecule comprises a region  
2 consisting of the sequence as set forth in Seq. ID. No. 30, 32 or 34.

1           7.     An at least partially purified  $\alpha_1$  subunit of a mammalian T-type calcium  
2 channel.

1           8.     The  $\alpha_1$  subunit of claim 7, wherein the subunit has the sequence as set forth in  
2     Seq. ID No. 24, 26 or 28 .

1           9.     The  $\alpha_1$  subunit of claim 7, wherein the subunit comprises a region consisting  
2     of the sequence as set forth in Seq. ID. No. 31, 33 or 35.

1           10.    A eukaryotic cell transiently or stably transformed with the vertebrate  
2     expression vector comprising a sequence of nucleotides that encodes an  $\alpha_1$  subunit of a  
3     mammalian T-type calcium channel, wherein the cell expresses the  $\alpha_1$  subunit of a  
4     mammalian T-type calcium channel.

1           11.    The cell of claim 10, wherein the sequence of nucleotides is selected from  
2     sequences of nucleotides encoding a protein including the sequence of amino acids set forth in  
3     SEQ ID. No. 18, 20, 24, 26, 28, 31, 33, or 35, and sequences of nucleotides that hybridize  
4     under conditions of medium hybridization stringency to DNA encoding a protein including  
5     the sequence set forth in SEQ ID No. 18, 20, 24, 26, 28, 31, 33, or 35.

1           12.    The cell of claim 10, wherein the calcium channel is a human calcium  
2     channel.

1           13.    The cell of claim 10, wherein the sequence of nucleotides has the sequence as  
2     set forth in Seq. ID. No. 23, 25 or 27 .

1           14.    The cell of claim 10, wherein the sequence of nucleotides comprises a region  
2     consisting of the sequence as set forth in Seq. ID. No. 30, 32 or 34.

1           15. The cell of claim 10, wherein the sequence of nucleotides has the sequence as  
2 set forth in Seq. ID. No. 27.

1           16. The cell of claim 10, wherein the cell is further transformed with and  
2 expresses an  $\alpha 2\delta$  or a  $\beta$  calcium channel subunit, or both.

1           17. A eukaryotic cell transiently or stably transformed with a heterologous DNA  
2 fragment comprising a sequence of nucleotides that encodes an  $\alpha_1$  subunit of a mammalian T-  
3 type calcium channel, wherein the cell expresses the  $\alpha_1$  subunit of a mammalian T-type  
4 calcium channel.

1           18. The cell of claim 17, wherein the cell is further transformed with and  
2 expresses an  $\alpha 2\delta$  or a  $\beta$  calcium channel subunit, or both.

1           19. A method for the production of an  $\alpha_1$  subunit of a mammalian T-type calcium  
2 channel comprising, culturing a cell transiently or stably transformed or transfected with DNA  
3 encoding the calcium channel subunit under conditions such that the DNA is expressed and  
4 the  $\alpha_1$  subunit is produced.

1           20. A process for producing a eukaryotic cell that is transiently or stably transformed  
2 and expresses a mammalian T-type calcium channel, comprising the step of introducing RNA  
3 or DNA encoding an  $\alpha_1$  subunit of a mammalian T-type calcium channel.

1           21. A method of identifying compounds capable of acting as agonists or antagonists  
2 for T-type mammalian calcium channels, comprising contacting a recombinant cell expressing  
3 a heterologous  $\alpha_1$  subunit of a mammalian T-type calcium channel, with an agent to be tested,  
4 and evaluating the interaction, if any, between the agent to be tested and the calcium channel.

1           22.    An isolated DNA fragment having the sequence given by SEQ ID No. 19, 27  
2 or 29.

1           23.    A method for mapping the distribution of T-type calcium channels within a  
2 tissue sample comprising the steps of exposing the tissue to a reagent comprising a directly-  
3 or indirectly-detectable label coupled to a DNA fragment comprising a sequence selected  
4 from among those sequences given by SEQ ID Nos. 13-17, 19, 23, 25, 27, 29, 30, 32 and 34,  
5 and detecting reagent that has bound to the tissue.

1           24.    A DNA fragment comprising a sequence of oligonucleotide that encodes a  
2 calcium channel, wherein the sequence of nucleotides is selected from sequences of  
3 nucleotides encoding a protein including the sequence of amino acids set forth in SEQ ID. No.  
4 18, 20, 24, 26, 28, 31, 33, or 35, or a nucleotide sequence obtainable by subcloning a PCR  
5 product of SEQ ID Nos: 13, 14, 15, or 16, labeling it by random hexamer priming, using the  
6 primer to screen a commercial human brain cDNA library to produce partial sequence clones  
7 containing overlapping cDNAs and ligating cDNAs obtained to produce full length cDNA  
8 encoding a calcium channel protein.

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